REMARKS

The April 1, 2011 Office Action noted that claims 8-10 were pending; objected to claims 9 and 10 as reciting allowable subject matter, but dependent from a rejected base claim; and rejected claim 8 under 35 U.S.C. § 103(a) as unpatentable over articles by Fischer et al., "Space-Time Transmission using Tomlinson-Harashima Precoding" and Yao et al., "Lattice-Reduction-Aided Detectors for MIMO Communication Systems" published in 2002 (apparently in volume 1 of the Proceedings of the IEEE Global Telecommunications Conference, GLOBECOM '02). Claims 8-10 remain pending and under consideration. The rejection is traversed below.

In the rejection of claim 8 on page 4 of the April 1, 2011 Office Action, it was acknowledged that the article "Space-time Transmission Using Tomlinson-Harashima-Precoding" by Fischer et al. does not disclose "applying the nonlinear precoding method only to a reduced channel matrix ... whose interference elements are chosen to assume the range of values ... from the set of positive or negative integers including zero" (claim 8, last 5 lines). To overcome this deficiency, the April 1, 2011 Office Action cited "page 424, 2nd column, 4th paragraph; page 425, col. 2, 3rd paragraph" of Yao et al. as teaching "only to a reduced channel matrix Hred that is calculated from the equation H = Hred R, whereby H is the known channel matrix and R is a residual interference matrix R, whose interference elements are chosen" (Office Action, page 4, lines 10-11, apparently quoting words on lines 11-13 of claim 8 without using subscripts).

First, due to the imprecise identification of the relevant portions of Yao et al. that were cited in rejecting claim 8, a copy of what is understood to have been cited is provided below.

> *Nulling* : First, the channel matrix is factored as $\mathbf{H} = \mathbf{QR}$, where $\mathbf{Q}$ is unitary and $\mathbf{R}$ is upper triangular. Next, the received signal is preprocessed to obtain $\mathbf{y}' = \mathbf{Q}^{\dagger}\mathbf{y} = \mathbf{Rx} + \mathbf{w}'$, where $\mathbf{w}' = \mathbf{Q}^{\dagger}\mathbf{w}$ and $\dagger$ denotes the conjugate transpose operation, so

$$\begin{bmatrix} y'_1 \\ y'_2 \\ \vdots \\ y'_{N_t} \end{bmatrix} = \begin{bmatrix} r_{11} & \cdots & \cdots & r_{1N_t} \\ 0 & r_{22} & \cdots & r_{2N_t} \\ \vdots & \ddots & \ddots & \vdots \\ 0 & \cdots & 0 & r_{N_tN_t} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_{N_t} \end{bmatrix} + \begin{bmatrix} w'_1 \\ w'_2 \\ \vdots \\ w'_{N_t} \end{bmatrix} . \quad (2)$$

> In this particular example, if we were to consider the lattice basis vectors to be $\begin{bmatrix}1 & 1\end{bmatrix}^T$ and $\begin{bmatrix}1 & -1\end{bmatrix}^T$ instead of $\begin{bmatrix}2 & 0\end{bmatrix}^T$ and $\begin{bmatrix}3 & 1\end{bmatrix}^T$, where ^{T} denotes the transpose operator, then the decision boundaries for ICD and BLAST detection would coincide with those of MLD, and therefore be optimal.

If this is not what the Examiner intended to cite in Yao et al. and claim 8 continues to be rejected over Fischer et al. in view of Yao et al., it is submitted that the next Office Action should not be made final and the relevant portions of Yao et al. should be identified with more precision.

As recited at the end of claim 8, "R is a residual interference matrix indicating remaining interferences at the receive-side, the residual interference matrix containing interference elements chosen to assume a range of values $A_k \cdot M_k z_{kl}$, where z_{lk} is from the set of positive or negative integers including zero." Thus, there is not complete crosstalk cancelation but rather a partial precoding at the transmitter side that leaves residual (remaining) interference signals at the receiver side. As a result, in "[a] nonlinear precoding method ... for ... a digital broadcast channel with ... decentralized, non-interconnected receiving stations" (claim 8, lines 1-4) a benefit is provided in that the available diversity, due to the interference signals present, can be utilized.

On the other hand, all of columns 2 and 3 of Yao et al. (except the last 3 lines of column 3) are part of a section entitled "Traditional Detectors." The cited portions of Yao et al. are part of the description of inverse channel detection (ICD) and the Bell Labs Layered Space-Time (BLAST) receiver. The paragraph on page 424 cited in the April 1, 2011 Office Action is presumably the description of nulling in a BLAST receiver, while the paragraph on page 425 appears to be a variation of ICD and BLAST in which "the decision boundaries for ICD and BLAST detection would coincide with those of MLD, and therefore be optimal" (page 425, column 1, lines 13-14 from bottom). Thus, the paragraphs cited in Yao et al. are part of the description of a method for detecting a signal at **one** receiver in a "multiple-input multiple-output (MIMO) digital communication system" (page 424, column 2, lines 2-3). This is a fundamental contrast to "transmit-side preequalization of K user signals to be transmitted in a digital broadcast channel with known transmission channel matrix H set up between a central transmitting station and K decentralized, non-interconnected receiving stations" (claim 8, lines 2-4). Therefore, it is submitted that a person of ordinary skill in the art not consider the document of Yao et al. to further develop a precoding method for a broadcast channel with decentralized receivers.

If someone skilled in the art nevertheless considered Yao et al., he or she would find the following:

1. Equalizing is performed at the receiver side
2. Lattice reduction is performed to get basis vectors (of the new channel matrix H') less correlated and shorter

(see page 425, 2nd column, 5th paragraph). Thus the matrix R or P according to Yao et al. is not equivalent to the residual interference matrix R of the invention because the lattice reduction of Yao et al. is not made with the object to get a residual interference matrix R having (interference) elements in "a range of values $A_k \cdot M_k z_{kl}$" (claim 8, last 2 lines) that can be cancelled at "K decentralized, non-interconnected receiving stations" (claim 8, line 4).

Thus, it is submitted that what is described in Yao et al. does not overcome the acknowledged deficiencies of Fischer et al. Therefore, it is submitted that claim 8 patentably distinguishes over Fischer et al. in view of Yao et al. As claims 9 and 10 depend from claim 8, it is submitted that claims 8-10 are in a condition suitable for allowance. Reconsideration of the claims and an early Notice of Allowance are earnestly solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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